Department of Energy
Implementation Plan

for

Defense Nuclear Facilities Safety Board
Recommendation 97-1

Safe Storage of Uranium-233

September 25, 1997

Executive Summary

On April 25, 1997, the Department of Energy (Department) accepted Defense Nuclear Facilities Safety Board (Board) Recommendation 97-1. The Recommendation addresses the need to safely store the existing inventories of unirradiated uranium-233 (U-233) bearing materials. An accompanying report prepared by the Board staff entitled "Uranium-233 Storage Safety at Department of Energy Facilities," DNFSB/TECH 13, describes the Board's perspective of the safety of U-233 as it is currently stored. The Department has an inventory of approximately two metric tons of U-233 in many different chemical and physical forms, and stored under a variety of conditions throughout the complex. The largest quantities are at Oak Ridge National Laboratory (ORNL) and Idaho National Engineering and Environmental Laboratory (INEEL), with lesser quantities at Los Alamos National Laboratory (LANL). Smaller quantities exist at numerous other sites. Some of the U-233 bearing material is being managed under the Department's National Spent Nuclear Fuel Program or under the Implementation Plan (IP) for Board Recommendation 94-1.

The Department is addressing all the sub-recommendations in Board Recommendation 97-1 through a methodical process. This process is being accomplished in the shortest possible time consistent with a graded approach, available funding, and safety of the personnel involved. At the same time, the safety of existing U-233 storage is ensured through near-term risk assessments, surveillance activities, and safety assurance actions at each affected site (see Table 1). Significant near-term safety problems identified through this process will be corrected. Results of the site activities will provide input to the systems engineering (SE) process. The Department has already commenced taking necessary actions to ensure stabilization of conditions at sites where U-233 materials are located.

Simultaneously, the Department is developing a strategy for long-term storage of U-233 until final determination of material disposition. The U-233 Safe Storage Program will establish a long-term solution to problems associated with safe U-233 storage throughout the complex. The best solution will be selected by subjecting the problem to an SE process which will fully define the driver requirements, the program mission, the system requirements, the functional and operational requirements, the available options, the selected system conceptual design, and the program execution plan. This process helps to ensure that the recommended approach is effective, can be accomplished in a reasonable time frame, incurs no unacceptable risk, and can be accomplished at a defensible cost.

Concurrent with the two-pronged approach just described, the Department will develop a standard for interim and long-term packaging and storage of U-233. The U-233 Safe Storage Standard will guide actions for assessment of existing packaging adequacies, and actions for stabilization and repackaging. To facilitate relocation and/or consolidation of U-233 inventories, the U-233 Safe Storage Standard will be compatible with current transportation systems. The U-233 Safe Storage Standard will address physical and chemical form of the material, package characteristics, and operational interfaces with the storage systems.

The timeline of activities associated with this two-pronged approach is shown in Figure 1 and the terminology utilized in this plan is contained in Attachment B, Glossary of Terms. A summary of the Section 6.3 commitments to the Board is provided in Table 2. The Department has completed a first iteration of system definition to support preparation of this IP. This IP constitutes the management and technical plan until the Program Execution Plan (PEP) is issued in December 1998.

Complex Wide	Compile U-233 site assessments Develop U-233 Safe Storage Standard Establish waste classification threshold criteria
Oak Ridge National Laboratory– Building 3019	Conduct smear sampling of storage vaults off-gas piping Perform gas and smear sampling of 50% of storage vaults Procure hot cells for inspection and repackaging Install hot cells and equipment Perform trend analysis of off-gas survey data Review hazards and risks of P-24 tank transfer Conduct natural phenomena hazards analysis Assess ventilation system requirements Consolidate U-233 from small-holdings sites* Complete glove box off-gas system upgrades
Los Alamos National Laboratory	Complete streaming study to prepare Chemical and Metallurgical Research (CMR) floor hole storage array Radiograph U-233 material currently located in TA-18 Hillside Vault Complete USQD for storage, consolidation, and stabilization of material in the CMR Building Transport excess U-233 material from Hillside Vault to CMR Building*
Idaho National Engineering and Environmental Laboratory	Relocate 12 drums from Air Support Building (ASB) to Intermediate Level Transuranic Storage Facility (ILTSF) Relocate 65 drums from ILTSF to enclosed storage* X-ray tomography of 12 drums in ASB-II Inspect and overpack 53 drums at ILTSF* Analyze gas samples from 50% of Light Water Breeder Reactor (LWBR) vaults Inspect (video) LWBR dry storage vaults
Other Sites	Assess storage conditions Identify excess U-233 materials for consolidation Prepare U-233 material for shipment Ship excess U-233 materials to ORNL*

* Activities will be undertaken pursuant to appropriate National Environmental Policy Act (NEPA) review.

Table 1. Key Near-Term Actions

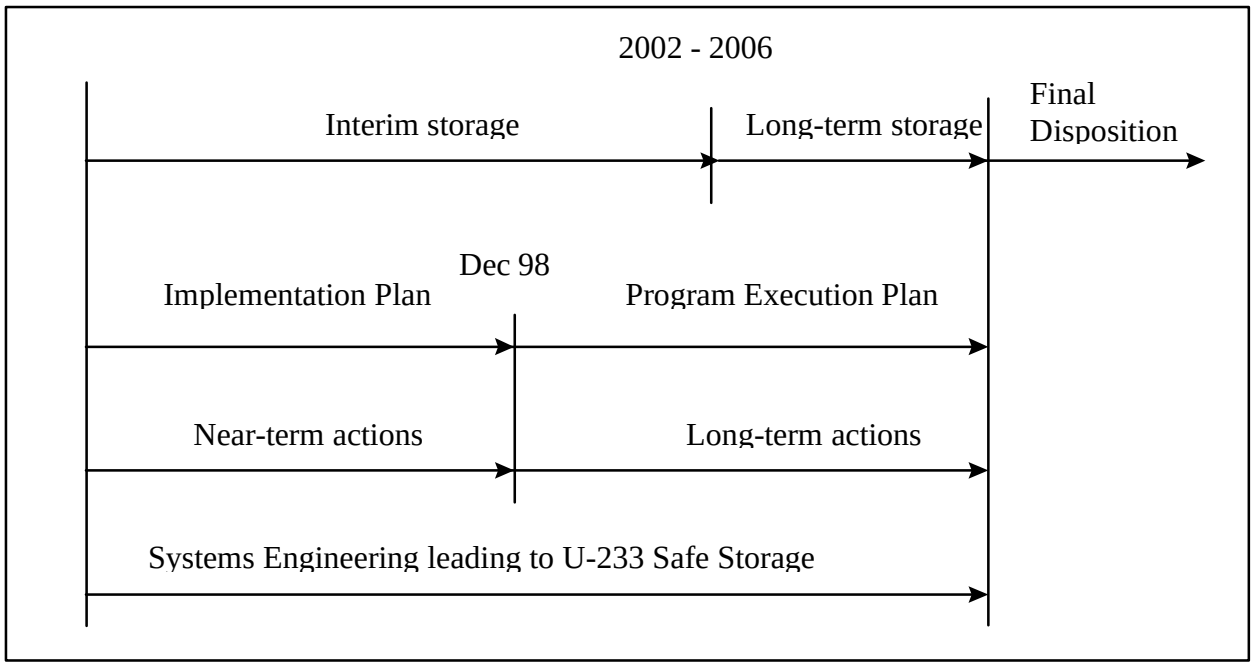

Figure 1. U-233 Safe Storage Program Timeline

Commitment Number	Deliverable	Due Date
1	U-233 Waste Threshold Criteria (2)	May 1998
2	Draft U-233 Safe Storage Standard (2)	April 1998
3	Final U-233 Safe Storage Standard (2)	September 1998
4	LANL initial Site Assessment Report (3,4)	December 1997
5	ORNL initial Site Assessment Report (3,4)	March 1998
6	INEEL initial Site Assessment Report (3,4)	March 1998
7	LANL final Site Assessment Report (3,4,5,6)	December 1998
8	ORNL final Site Assessment Report (3,4,5,6)	June 1999
9	INEEL final Site Assessment Report (3,4,5,6)	December 1998
10	Small Holdings Sites Assessment Report (3,4,5,6) (if required)	December 1998
11	Strategy for the Future Use and Disposition of U-233 (7)	January 1998
12	Technical Competency Report (8)	January 1998
13	Technical Data Book (8)	April 1999
14	Building 3019 Alternatives Trade Study (4,7)	September 1998
15	System Requirements Document (7)	March 1998
16	System Design Document (7)	October 1998
17	U-233 Safe Storage Program Execution Plan (7)	December 1998
18	Annual Progress Reports (1)	January 1998 (annual)

( ) Sub-recommendation

Table 2. Summary of Commitments

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1. Background

On March 3, 1997, the Defense Nuclear Facilities Safety Board (Board) issued Recommendation 97-1 which deals with the safe storage of unirradiated uranium-233 (U-233) bearing material. On April 25, 1997, the Secretary of Energy accepted the Board's Recommendation.

The Recommendation describes actions that the Board considers necessary to improve the safe storage of U-233 bearing materials in the interim and the longer term. Eight sub-recommendations detail those actions:

1. Establish a single line project to deal with issues attached to safe storage of U-233;

2. Develop the standards to be used for packaging, transportation, and interim and long-term storage;

3. Characterize the items of U-233 presently in storage in the Department of Energy's (Department) defense nuclear facilities as to material, quantity, type and condition of storage container;

4. Evaluate the conditions and appropriateness of the vaults and other storage systems used for the U-233 at the Department's defense nuclear facilities;

5. Assess the state of storage of the items of U-233 in light of the standards mentioned in sub-recommendation 2 above;

6. Initiate a program to remedy any observed shortfalls in ability to maintain the items of U-233 in acceptable interim storage;

7. Establish a plan for the measures that can eventually be used to place the U-233 in safe permanent storage; and

8. Until these ultimate measures are taken, ensure that the Department's complex retains the residue of technical knowledge and competence needed to carry through all of the measures needed to ensure safe storage of the U-233 bearing material in the short and the long term.

The Recommendation had been preceded in February, 1997, by a Board technical report entitled "Uranium-233 Storage Safety at Department of Energy Facilities" - DNFSB/TECH 13. The report described the Board's perspective of the safety of U-233 stored at various sites in the Department's complex. This formed the basis for the Board's sub-recommendations. The report also acknowledged the Department's Highly Enriched Uranium (HEU) Vulnerability Assessment (VA) completed in August 1996. As a result of that assessment, the Department was aware of the legacy issues surrounding the storage of U-233 bearing material. The HEU VA assessors had come to many of the same conclusions as those described in DNFSB/TECH 13. At the time of issuance of Recommendation 97-1, the Office of Defense Programs had undertaken the development of a plan describing the necessary corrective actions for the most significant vulnerabilities identified in the HEU VA. The HEU Vulnerability Management Plan was subsequently issued on June 13, 1997.

U-233 is a man-made isotope of uranium primarily formed as a result of neutron bombardment of thorium-232 (Th-232). Because U-233 is fissile, its potential use as fuel for nuclear reactors and as

nuclear weapons material was researched extensively by the Department beginning in the 1950s. Since the completion of these research programs, various feasibility studies have been undertaken, but no major U-233 programs have been funded. Thus, the bulk of the U-233 has remained in various storage packages and systems. Due to inherent radiation, many of these packages have not been inspected for years, and their condition is unconfirmed.

Significant in the production of U-233 from thorium is the formation of uranium-232 (U-232), which is an undesirable contaminant isotope. The radioactive decay of the U-232 and its daughters in U-233 bearing material leads to high radiation fields and is important in determining the storage requirements. Of particular concern is a high energy [2.6 million electron volts (MeV)] gamma ray that is emitted from thallium-208 (Tl-208), a daughter nuclide of U-232 decay. Depending on the amount of U-232 present in the U-233, the surrounding radiation field can range up to tens of rem/hr. This radiation field causes handling for visual inspection, re-packaging, or any form of processing to be difficult from the exposure to ionizing radiation standpoint and As Low As Reasonably Achievable (ALARA) principles. Another nuclide included in the decay chain of U-232 is radon-220 (Rn-220), which exists as a gas under standard conditions. This necessitates special precautions for control and holdup of Rn-220 in ventilation systems to allow sufficient time for decay to a filterable isotope.

The Department has an inventory of approximately two metric tons of U-233 in many different forms stored under a variety of conditions throughout the complex. The majority is located at the Oak Ridge National Laboratory (ORNL) and the Idaho National Engineering and Environmental Laboratory (INEEL), with significantly lesser quantities at Los Alamos National Laboratory (LANL). Even smaller quantities of material exist at numerous other sites. The material exists as oxides, metal, solutions, and fluorides. Some, but not all of this material is being managed under the Department's National Spent Nuclear Fuel Program and under the Implementation Plan (IP) for Board Recommendation 94-1 [i.e., the Oak Ridge Molten Salt Reactor Experiment (MSRE)].

2. Underlying Causes

The Department assessed the safety issues associated with Recommendation 97-1 in terms of the history of U-233. The primary safety issue being addressed is the lack of material characterization and uncertainty of storage conditions for U-233. The Department determined that there are five underlying causes contributing to this unresolved safety issue which are summarized below:

1. There is limited current use for U-233.

   Originally, U-233 was intended to supplement U-235 as nuclear reactor fuel and as material for use in nuclear weapons. However, this need currently does not exist. The Department has not identified a mission for the majority of the U-233 material in its current inventory. However, a potential application for cancer treatment is in clinical trials and may require the removal of Th-229 from some of the existing U-233 material, if proven successful.

2. Waste material containing U-233 does not fit neatly into any radioactive waste stream management program.

U-233 waste does not meet the definition for high-level waste or by-product (tailings) material in Order 5820.2A, the statutory definition for uranium mill tailings or, absent a Nuclear Regulatory Commission determination by rule, high-level waste. Such waste (unless the waste also contains sufficient quantities of transuranic material) does not meet the criteria for transuranic waste under Order 5820.2A. But, due to its long half-life and high alpha activity, low-level waste treatment and near-surface disposal is inappropriate for U-233 waste.

3. There are unique hazards associated with U-233.

   U-233 possesses significant radiological hazards which make "hands on" contact handling and inspection of the material difficult from an ALARA standpoint. Existing facilities are not equipped to routinely handle, inspect, or repackage U-233 material consistent with current safety standards.

4. In the absence of regulatory, technical or programmatic drivers, the materials were assigned a low priority relative to defense and immediate risk reduction activities.

   The Department has been hesitant to handle, process, or repackage the material in the absence of consistent long-term storage criteria or a disposition strategy due to the lack of life cycle considerations. Future decisions would almost certainly require further efforts, additional funding, and additional worker exposure to make packages consistent with long-term storage or disposition criteria.

5. There is diffuse management responsibility of U-233.

   U-233 management falls under the purview of various secretarial offices within the Department at different sites. Inconsistent Departmental priorities have historically relegated this material to a "no action" status.

The above underlying causes clearly indicate the need for a more systematic and integrated approach to the actions necessary for safe storage and disposition of the Department's U-233 inventory.

3. Program Mission, Scope, Objectives, and Assumptions

3.1 Program Mission

The mission of the U-233 Safe Storage Program is to safely manage existing inventories of U-233 material until disposition or use.

3.2 Scope

This IP is applicable to U-233 in unirradiated form in storage at INEEL, ORNL and LANL, as well as at the sites designated herein as "other sites." These sites include New Brunswick Laboratory, Argonne National Laboratory-East and West, Brookhaven National Laboratory, the Oak Ridge Y-12 Plant, Hanford Site, Lawrence Livermore National Laboratory, and Rocky Flats Environmental Technology Site.

Material currently at licensed facilities or facilities under the purview of the Naval Reactors Program is out of scope. Should any of this material be transferred to the Department, it will be included in this scope. Spent fuel containing U-233, located at INEEL, Savannah River Site, and other sites, is considered out of scope, since these materials are managed under the National Spent Nuclear Fuel Program. Similarly, the U-233 associated with MSRE is addressed under the IP for Board Recommendation 94-1, and is therefore outside the scope of this IP. However, once the U-233 material is removed from MSRE and stabilized, it will re-enter the scope of this IP. Most sites have stored wastes containing U-233. Most of this waste will likely be excluded from consideration by this IP, once the waste threshold criteria have been established (see Commitment 1).

3.3 Objectives

In support of this mission, several objectives have been identified by the Department:

1. Characterize material conditions in order to improve the current information base.

2. Implement measures to ensure or verify safe and secure interim and long-term storage conditions.

3. Identify options and prepare for stabilization or disposition of U-233 material.

4. Define ownership for the management of U-233 material.

5. Ensure risks to personnel and the environment meet the ALARA philosophy.

3.4 Assumptions

1. Safety concerns associated with spent nuclear fuel containing U-233 are being addressed under the Department's National Spent Nuclear Fuel Program and are not within the scope of this IP.

2. U-233 safety concerns related to the MSRE at ORNL are being addressed in Board Recommendation 94-1 IP and are not within the scope of this IP.

3. Materials containing U-233 below the waste threshold criteria (developed under commitment 1) will be addressed under the Department's Waste Management Program and are not within the scope of this IP.

4. ALARA considerations will be influencing factors in determining the characterization and stabilization priorities.

5. Funding for near-term actions will be the responsibility of the current program offices.

6. Long-term funding needs will be addressed through the normal budget process.

7. Repackaging and stabilization of material may be required.

4. Organization and Management

4.1 Organization

The Department chartered a 97-1 Task Team to establish the program logic for developing the U-233 management programs responsive to each 97-1 sub-recommendation. The program logic was established and is being used to develop site-specific, near-term actions. The 97-1 Task Team reviewed the site-specific actions and prepared this IP accordingly. A team of technical experts (Technical Team) from across the Department complex has now been assembled to take over the work begun by the Task Team. The purpose of the Technical Team is to complete the systems engineering work and advise the Director of the Nuclear Materials Stabilization Task Group (NMSTG) on implementation of the Department's plan for Recommendation 97-1. The Technical Team will oversee the initial assessments, conduct the systems analyses, and develop the Program Execution Plan (PEP). They will provide peer reviews of site-specific products and systems engineering products. The Technical Team will function under a chairman (who reports to the Director of the NMSTG) who is responsible for leadership and coordination of Technical Team activities. The chairman will provide information and reports to the Board staff on a periodic basis. The position may be filled on a rotating basis. The chairman will assign site technical leads to head-up deliverables such as site assessment reports.

The management of U-233 bearing materials involves several program offices within the Department including Environmental Management (EM), Defense Programs (DP), Nuclear Energy (NE), and Fissile Materials Disposition (MD). To ensure consistency and facilitate commitment status tracking, the Department has patterned the management program for the 97-1 Recommendation after the management program responding to Board Recommendation 94-1. Specifically, the Director of the NMSTG, EM-66, will lead and coordinate the U-233 management activities. Program offices will perform their program management functions and be responsible for funding their commitments. Field Offices and contractors will be responsible for project planning and performing the work required to meet these IP commitments.

Project planning by each site is to include development of a Recommendation 97-1 IP Site Integrated Stabilization Management Plan (SISMP), following the guidelines promulgated in the "Guidelines for Preparation and Administration of DNFSB 94-1 IP Site Integrated Stabilization Management Plans" Revision A, dated February 13, 1996. The 97-1 IP SISMP will be appended to the site's 94-1 IP SISMP. Recommendation 97-1 progress reports will be submitted to the responsible headquarters Program Office with a copy to the NMSTG.

4.2 Management Systems

4.2.1 Change Control

Any anticipation of significant changes in deliverable due dates (commitment dates) will be promptly brought to the attention of the Board prior to the passing of the commitment date. Fundamental changes to the IP's strategy, scope, or schedule will be provided to the Board through formal revision of the IP. Minor changes to the strategy, scope, or schedule will be formally submitted in appropriate correspondence approved by the Cognizant Secretarial Officer, along with the basis for the changes and appropriate corrective actions.

4.2.2 Reporting

For this plan, the Department will provide annual reports to the Board. These reports will be submitted with the annual reports for Board Recommendation 94-1.

5. Technical Approach

The Department is utilizing a systems engineering (SE) approach to the problems identified in Board Recommendation 97-1 and concurrently the Department is taking near-term actions to assess storage conditions, and make necessary changes to mitigate interim identified risks. Results of the near-term assessments will be factored into the SE process as appropriate. The Department has completed a first iteration of system definition to support preparation of this IP. This IP constitutes the management and technical plan until the PEP is issued in December 1998.

The Department recognizes that the primary safety issue is lack of material characterization and the uncertainty of storage conditions for U-233 inventories. Findings from recent assessments (e.g., HEU VA) do not indicate any immediate risk to workers or the public from the stored U-233. The IP focuses, in the near term, on obtaining sufficient current information to improve Department knowledge regarding the extent of risk from current packaging and storage conditions. Initial field activities include gathering information from package records, conducting physical inspections within the current capabilities of storage facilities, and identifying potential safety issues with the packages or storage facilities. Near-term improvements in package or facility condition are being implemented as required to reduce identified risks. Additional actions may be necessary as a result of the initial assessments.

In parallel with the initial assessments and risk reduction activities, the Department is using an SE process to determine a set of storage system requirements, define and evaluate interim and long-term storage options, and develop a PEP. The PEP will describe the multi-year schedule for further assessment, storage facility upgrades, material stabilization, repackaging, maintenance of personnel expertise, and preparations for long-term storage or disposition. Results of the initial assessments will be integrated into the PEP.

6. Safety Issue Resolution

Resolution of the safety issues associated with U-233 storage is structured in terms of the eight sub-recommendations of the Board. The Department's discussions of near-term actions are described in Section 6.2, "Responses to Sub-recommendations." These near-term actions describe Department plans until issuance of the PEP. The Department's specific commitments and associated deliverables are described in Section 6.3, "Commitments."

In conjunction with the near-term actions, the SE process will develop requirements, define and evaluate alternative system solutions, and develop the multi-year PEP. This is described in Section 6.1, "Systems Engineering Approach."

Schedules for the near-term actions and SE process are summarized in the Appendix, "Completed and Near-Term Actions." Eighteen deliverables will be made in response to Recommendation 97-1. Four of these will document the SE results. (See Sections 6.3.11, 6.3.15, 6.3.16, and 6.3.17.)

6.1 Systems Engineering Approach

The SE approach provides the discipline to develop both the near-term and long-term responses to Board Recommendation 97-1. The key elements of this approach are illustrated in Figure 2. The functional hierarchy is included as Attachment C, "Hierarchy of Functions."

6.1.1 Originating Requirements

The SE process begins with identifying the originating requirements, which include the 97-1 Recommendation itself, the DNFSB/TECH 13 document, and the HEU VA report and its associated Corrective Action Plans.

6.1.2 Mission

The originating requirements drive this IP which effectively functions as the Department's mission statement for resolving U-233 storage issues. The IP is next combined with other external requirements, including applicable Department Orders, Standards, Federal Regulations and Laws, and other constraining documents, to drive the SE requirements analysis.

6.1.3 Requirements Analysis

The near-term site assessments and corrective actions are already underway. These will aid in defining the system requirements, as well as in identifying additional near-term actions. As part of the requirements analysis, one near-term activity is development of the Department U-233 Safe Storage Standard covering the storage and handling of U-233 materials at Department sites.

The System Requirements Document (SRD) is the key document defining critical technical and programmatic requirements for the U-233 safe storage problem long-term solution.

6.1.4 Functional Analysis

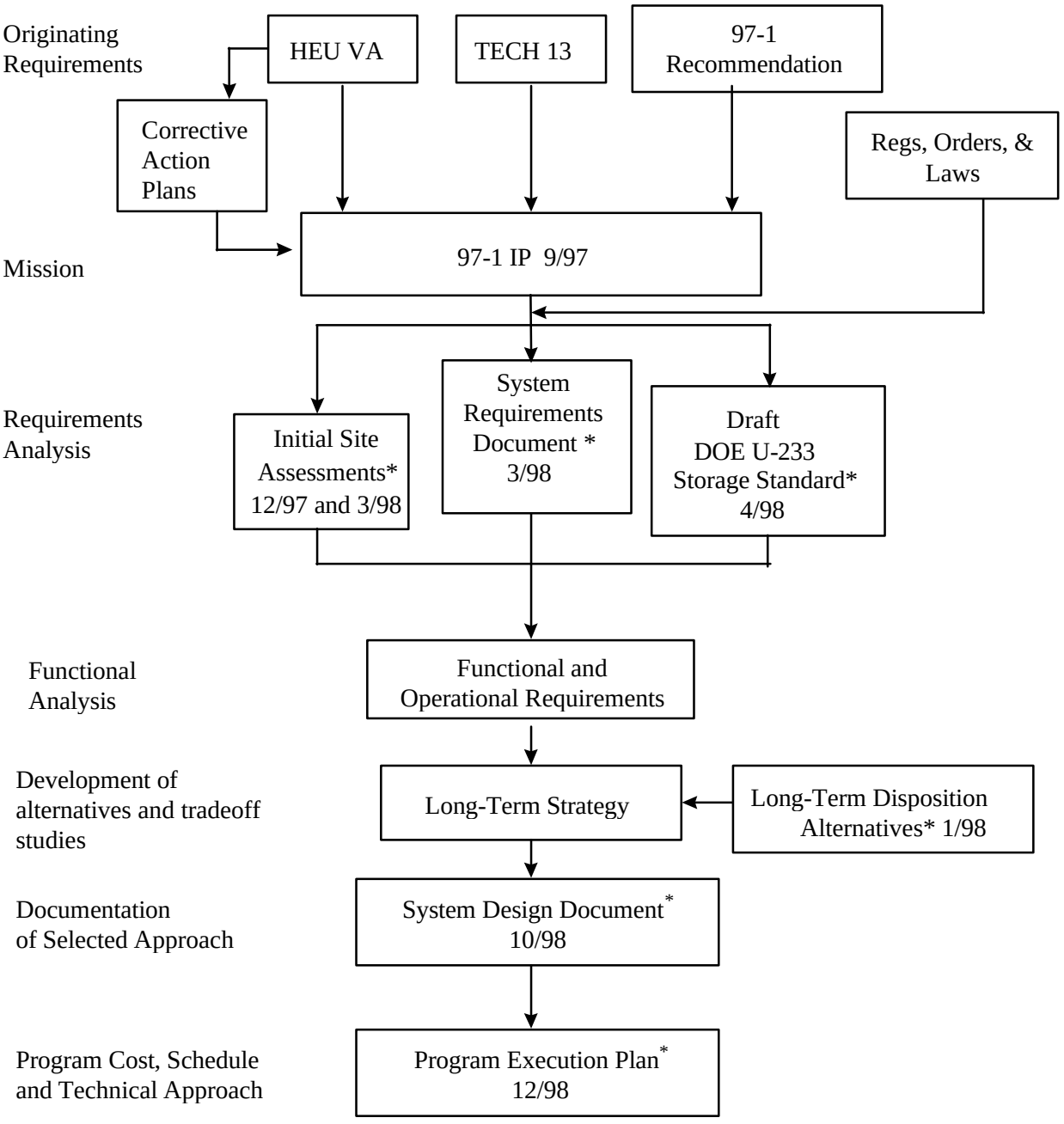
The next key step in the SE process is development of the functional and operational requirements (F&OR) document which translates the SRD requirements and the disposition strategy (boundary conditions) into a set of decomposed (stratified) functions describing all the functions a long-term storage system must provide, including operational functions.

6.1.5 Development of Alternatives and Tradeoff Studies

In the next phase of the SE process, alternatives are explored to assess available technologies, potential solutions, and cost/benefit characteristics of these alternatives. This study results in the long-term storage strategy.

One additional document required to develop an effective long-term solution is the preliminary disposition strategy for ultimate disposition of U-233. This document will, at a minimum, identify probable disposition options that appear compatible with any long-term storage solution. Its purpose is to anticipate issues that may accompany ultimate disposition.

Figure 2.
Recommendation 97-1 Key Systems Engineering Elements and Products



* 97-1 IP Deliverables

6.1.6 Documentation of Selected Approach

The long-term strategy is used to develop the solution describing the system to be designed. This conceptual design is then implemented in the implementation phase. The conceptual design is described in the System Design Document (SDD).

6.1.7 Program Cost, Schedule, and Technical Approach

The plan for actually implementing the program is developed and described in the PEP. The PEP addresses the engineering process and organizational responsibilities, and also contains the cost and schedule baselines in support of the SDD. At this point, the entire process is placed under configuration management and change control, so no organization can unilaterally revise the chosen approach without subjecting the proposed change to cost and schedule impact analysis. The overall U-233 safe storage program decision logic is shown in Figure 3.

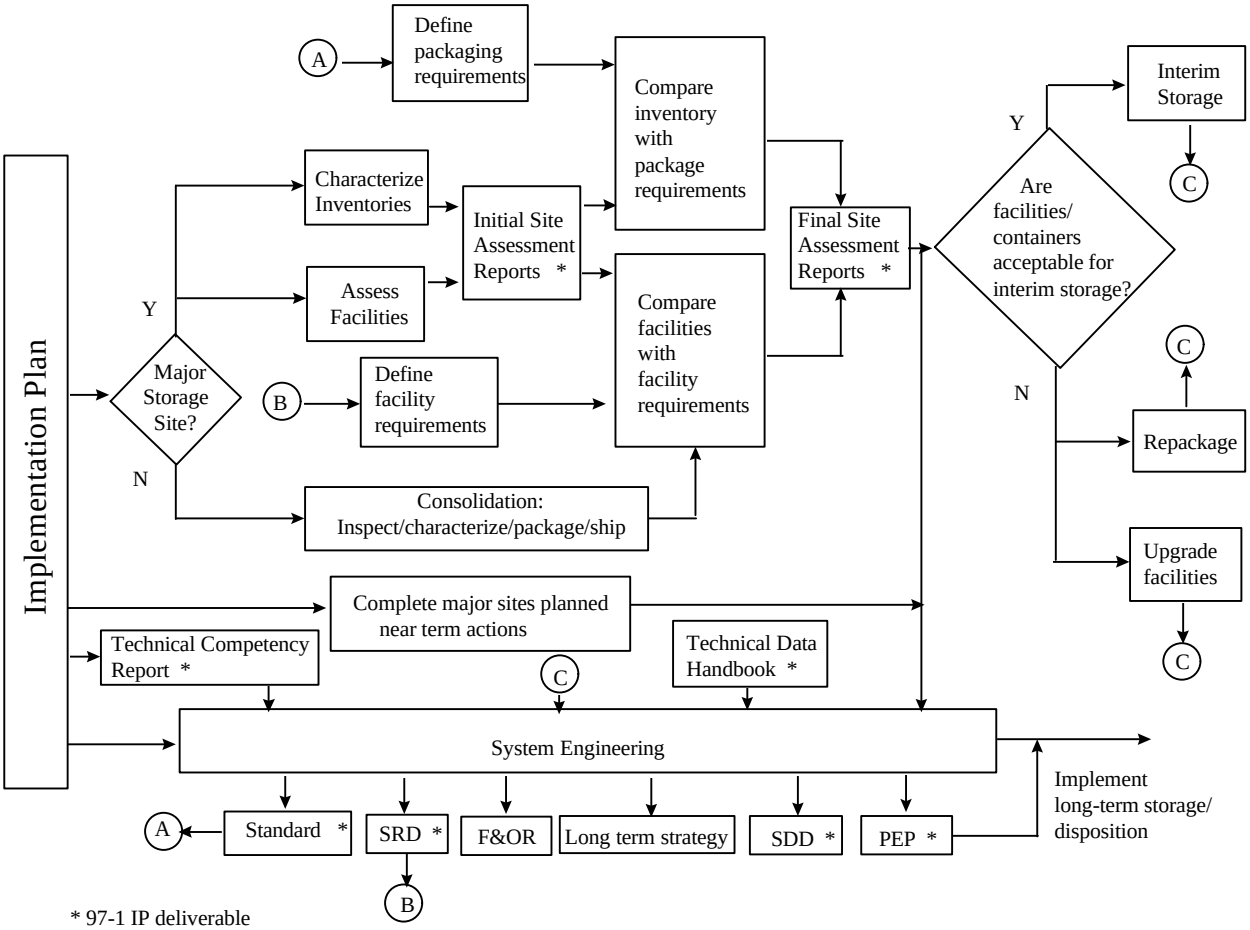


Figure 3. U-233 Safe Storage Program Decision Logic

These processes are described in greater detail in Attachment C where the functions are shown in a hierarchy of functions. Functions with a prefix of "1" are associated with the SE process for the long-term solution. Functions with a prefix of "2" are associated with the parallel effort to implement short-term

corrections and to assess the conditions of existing U-233 inventories. Functions with a prefix of "3" are associated with the implementation of long-term storage system which is defined and described in the SE process of function "1." Functions with the prefix "4" are those that are associated with the ultimate disposition effort. Prefix "4" functions serve essentially as place holders, but are necessary in defining the total solution for U-233 (the U-233 Safe Storage System). This becomes an active SE component once a disposition method is identified. The method may include beneficial uses of U-233, such as medical applications currently under consideration.

Figure 2 and Attachment C reflect the current status of the SE effort. The status will continually evolve through the initial SE process, until the PEP is produced. At that time the IP process is complete and the Department may undertake execution of the PEP.

6.2 Responses to Sub-recommendations

6.2.1 Sub-recommendation 1: Establish a single line project to deal with issues attached to safe storage of U-233.

As described in Section 4, the Director of the NMSTG has been named by the Assistant Secretaries for EM and DP to lead the U-233 Safe Storage Program. The NMSTG Director will provide oversight for the entire program and coordinate funding, technical, and regulatory issues among the Department offices and sites involved.

6.2.2 Sub-recommendation 2: Develop standards to be used for packaging, transportation, and interim and long-term storage of U-233.

Both U-233 bearing materials and waste need to be managed. The Department intends to define a threshold level for defining wastes which will be excluded from 97-1 IP considerations.

A standard for interim and long-term packaging and storage of U-233 will be developed to guide actions for assessing adequacy of current packages and for stabilization and repackaging. The U-233 Safe Storage Standard criteria will be compatible with transportation systems, to facilitate future relocation or consolidation of inventories. The Standard will address the physical and chemical form of the U-233 material, package characteristics, and operational interfaces with the storage systems. Because U-233 management issues are unique to the Department, these criteria will be issued as a Department Standard, rather than a Consensus Standard.

6.2.3 Sub-recommendation 3: Characterize the items of U-233 presently in storage in the Department's defense nuclear facilities, as to material, quantity, and type and condition of storage container.

Consistent with the ALARA principles, the Department plans to conduct characterization and stabilization activities concurrently. Equipment installation may be necessary before these activities can be performed.

A key issue in the Board 97-1 Recommendation is the lack of current information on the condition of stored U-233 packages. Existing U-233 inventory and package records must be assembled and analyzed to facilitate a risk-based decision process for future actions. Early survey inspections of storage vaults and outer containers will be performed to evaluate the condition of outer packages for detection of situations

which may require near-term corrective actions. The sites with significant inventories of U-233 (>5 kg) are already actively involved in assessment activities.

At INEEL, these early actions have included x-ray tomography of 12 drums at the ASB, and relocation of these drums to the ILTSF (completed). Fifty-three additional drums will be inspected and overpacked.

At ORNL Building 3019, the initial activities are intended to confirm the integrity of the U-233 packages stored in the vaults. Methods of inspection will be used that do not require package movement. Initial radiation surveys and smear sampling of off-gas lines from the storage vaults has been completed. Additional inspections include gas and smear sampling and video inspections of selected vaults, and trend analysis of off-gas data.

At LANL, inspection of a package of U-233 metal at the CMR Building was completed during the HEU VA. Materials in the Hillside Vault are being evaluated by radiography, preparatory to being moved to the CMR Building.

The 94-1 Small Sites/Small Holdings Task Team is including U-233 within its scope to address other facilities with small holdings of U-233. The intent of this addition is to aid the smaller sites in making their holdings ready for shipment to a consolidation site.

Based on the record assessments and the initial physical surveys at the sites, risk-prioritized inspection plans will be incorporated into the PEP.

6.2.4 Sub-recommendation 4: Evaluate the conditions and appropriateness of the vaults and other storage systems used for the U-233 at the Department's defense nuclear facilities.

The HEU VA recently analyzed the safety of uranium (including U-233) storage at Department facilities and identified several vulnerabilities. The vulnerabilities associated with U-233, as identified in the HEU VA, will be integrated with the SE process and managed as part of the 97-1 IP.

At INEEL, the 65 drums stored at the ILTSF will be relocated to an enclosed storage building and the site assessment report will evaluate the conditions and appropriateness of that storage building. Gas sampling and video inspection of 50% of the dry storage vaults containing the unirradiated Light Water Breeder Reactor (LWBR) fuel containers have been performed.

At ORNL Building 3019, hazard analyses will be conducted on the P-24 tank, ventilation systems, and building and storage structures as part of the safety analysis upgrade. A trade study will be conducted to compare continued use of Building 3019 with other alternatives for both interim and long-term storage.

At LANL, an unreviewed safety question determination (USQD) is underway to evaluate the storage, consolidation, and stabilization of materials in the CMR Building.

Each of these activities could result in corrective actions which will be incorporated into the PEP.

6.2.5 Sub-recommendation 5: Assess the state of storage of the items of U-233 in light of the standards mentioned in sub-recommendation 2 above.

The records and survey information will be systematically compared to the requirements of the packaging and storage criteria developed under sub-recommendation 2 to determine the need for repackaging, material stabilization, or additional inspection. The site assessments will determine the adequacy of storage systems and identify the actions required for interim and long-term storage.

6.2.6 Sub-recommendation 6: Initiate a program to remedy any observed shortfalls in ability to maintain the items of U-233 in acceptable interim storage.

During the development of the PEP, which addresses long-term improvements in the U-233 Safe Storage System, several near-term corrective actions are being implemented or have already been completed. These near-term actions include:

1. Completing the neutron streaming study at LANL, and preparing the CMR Building floor hole storage array for receipt and storage of U-233;

2. Consolidating U-233 inventories at LANL from the Hillside Vault to the CMR Building;

3. Relocating drums at the INEEL ILTSF to an enclosed storage facility at the Radioactive Waste Management Complex (RWMC);

4. Procuring new package handling and inspection equipment for ORNL Building 3019, to add the capability of safely handling packages that have been stored for extended periods;

5. Procuring new hot cells for ORNL Building 3019 to enable detailed package characterization (these must be installed and properly equipped);

6. Modifying the ORNL Building 3019 transport carrier to address the vulnerability associated with moving packages of uncertain condition;

7. Initiating ORNL Building 3019 ventilation upgrades; and

8. Consolidating small site holdings.

6.2.7 Sub-recommendation 7: Establish a plan for the measures that can eventually be used to place the U-233 in safe permanent storage.

The Department will complete the definition and study of alternatives for the safe, long-term storage and ultimate disposition of surplus U-233. This alternatives study identifies technical, regulatory, and legal issues that must be addressed prior to disposition. The alternatives study provides a number of potential end states as a result of the SE analysis of U-233 storage. The U-233 Safe Storage PEP will be the final deliverable of the initial phase of the SE process.

6.2.8 Sub-recommendation 8: Until these ultimate measures are taken, ensure that the Department's complex retains the residue of technical knowledge and competence needed to carry through all of the measures needed to ensure safe storage of the U-233 in the short and the long term.

The technical expertise to handle, process, and safely store U-233 is similar to the expertise for handling and processing other high specific activity alpha, beta, gamma, and neutron emitters, such as selected isotopes of neptunium, plutonium, americium, curium, and higher actinides. The Department has core programs involving these nuclides that provide continuing experience for technical, facility and operational personnel. In addition, there is a substantial body of literature on the handling and processing of U-233. The Department has established a technical working group comprised of U-233 experts from across the Department complex. This group is providing technical guidance and performing the systems studies. One function of the Technical Team will be to document the scientific and technical disciplines available in ongoing programs related to U-233 and other relevant actinides. This report will provide assurance that near-term expertise is identified to support the U-233 Safe Storage Program. The PEP will describe an approach to maintain expertise over the extended periods of storage of the U-233. The Technical Team will assemble a U-233 Technical Data Book that will document U-233 radiochemical properties, U-233 processing technology, and U-233 handling guidelines.

6.3 Commitments

6.3.1 Commitment 1: Develop U-233 waste threshold criteria

Specific threshold criteria to differentiate between U-233 material which can be accepted into the waste streams from U-233 material which is subject to this IP will be developed. (Sub-recommendation 2)

Deliverable: U-233 Waste Threshold Criteria Document
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: May 1998

6.3.2 Commitment 2: Develop the draft U-233 Safe Storage Standard

A Department Standard for interim and long-term packaging and storage of U-233 will be developed to guide actions for assessing adequacy of current packages and for stabilization and repackaging. (Sub-recommendation 2)

Deliverable: Draft U-233 Safe Storage Standard
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: April 1998

6.3.3 Commitment 3: Develop the final U-233 Safe Storage Standard

A Department Standard for interim and long-term packaging and storage of U-233 will be finalized. (Sub-recommendation 2)

Deliverable: Final U-233 Safe Storage Standard
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)

Date: September 1998

6.3.4 Commitment 4: Prepare LANL initial Site Assessment Report

Los Alamos National Laboratory will conduct the near-term assessments described in Sections 6.2.3 and 6.2.4. A technical status report will be prepared summarizing information developed from its assessments and initial inspections. (Sub-recommendations 3 and 4)

Deliverable: LANL initial Site Assessment Report
Responsibility: Manager, Albuquerque Operations Office
Date: December 1997

6.3.5 Commitment 5: Prepare ORNL initial Site Assessment Report

Oak Ridge National Laboratory will conduct the near-term assessments described in Sections 6.2.3 and 6.2.4. A technical status report will be prepared summarizing information developed from its assessments and initial inspections. (Sub-recommendations 3 and 4)

Deliverable: ORNL initial Site Assessment Report
Responsibility: Manager, Oak Ridge Operations Office
Date: March 1998

6.3.6 Commitment 6: Prepare INEEL initial Site Assessment Report

Idaho National Engineering and Environmental Laboratory will conduct the near-term assessments described in Sections 6.2.3 and 6.2.4. A technical status report will be prepared summarizing information developed from its assessments and initial inspections. (Sub-recommendations 3 and 4)

Deliverable: INEEL initial Site Assessment Report
Responsibility: Manager, Idaho Operations Office
Date: March 1998

6.3.7 Commitment 7: Prepare LANL final Site Assessment Report

Los Alamos National Laboratory will finalize its initial site assessment as described in Sections 6.2.5 and will identify if any remedies to observed shortfalls are needed in addition to those as listed in Section 6.2.6. (Sub-recommendations 3, 4, 5, and 6)

Deliverable: LANL final Site Assessment Report
Responsibility: Manager, Albuquerque Operations Office
Date: December 1998

6.3.8 Commitment 8: Prepare ORNL final Site Assessment Report

Oak Ridge National Laboratory will finalize its initial site assessment as described in Sections 6.2.5 and will identify if any remedies to observed shortfalls are needed in addition to those as listed in Section 6.2.6. (Sub-recommendations 3, 4, 5, and 6)

Deliverable: ORNL final Site Assessment Report
Responsibility: Manager, Oak Ridge Operations Office

Date: June 1999

6.3.9 Commitment 9: Prepare INEEL final Site Assessment Report

Idaho National Engineering and Environmental Laboratory will finalize its initial site assessment as described in Sections 6.2.5 and will identify if any remedies to observed shortfalls are needed in addition to those as listed in Section 6.2.6. (Sub-recommendations 3, 4, 5, and 6)

Deliverable: INEEL final Site Assessment Report
Responsibility: Manager, Idaho Operations Office
Date: December 1998

6.3.10 Commitment 10: Prepare Small Holdings Sites Assessment Report

The Department intends to consolidate U-233 material currently stored at a number of small holdings sites to the larger holdings site(s). If this consolidation is not complete prior to the end of 1998, then the Director of the NMSTG will prepare a technical report summarizing information developed from assessments and initial inspections at the small holdings sites. *If the consolidation is complete from the small holdings sites, then this report will not be necessary nor required. (Sub-recommendations 3, 4, 5, and 6)

Deliverable: Small Holdings Sites Assessment Report *
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: December 1998

6.3.11 Commitment 11: Document long-term disposition alternatives for U-233

An ongoing study of utilization and disposition options for excess U-233 will be issued as input for the SE analysis. (Sub-recommendation 7)

Deliverable: Strategy for the Future Use and Disposition of U-233
Responsibility: Director, Office of Fissile Material Disposition (MD-1)
Date: January 1998

6.3.12 Commitment 12: Technical Competency

The ongoing Department actinide programs with technical expertise applicable to the U-233 Safe Storage Program will be documented. (Sub-recommendation 8)

Deliverable: Technical Competency Report
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: January 1998

6.3.13 Commitment 13: Technical Data Book

A technical data book will be assembled for future reference documenting the knowledge base

gained through past U-233 operations. (Sub-recommendation 8)

Deliverable: Technical Data Book
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: April 1999

6.3.14 Commitment 14: Building 3019 Alternatives Trade Study

A trade study will be completed in order to evaluate Building 3019 at Oak Ridge and other possible storage facilities. (Sub-recommendations 4 and 7)

Deliverable: Building 3019 Alternatives Trade Study
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: September 1998

6.3.15 Commitment 15: Develop system requirements for U-233 Safe Storage System

The requirements for the U-233 Safe Storage System will be included in the SRD, a key product of the SE process (see Figure 2). (Sub-recommendation 7)

Deliverable: System Requirements Document
Responsibility: Assistant Secretary for Environmental Management (EM-1)
Date: March 1998

6.3.16 Commitment 16: Develop a system design description for interim and long-term storage of U-233

During the interim, before a permanent system is designed and developed to utilize, store, and/or dispose of the Department's inventory of U-233, existing U-233 storage conditions will be assessed and upgraded as necessary. Some U-233 materials will be relocated and consolidated, as a desirable alternative to upgrading several different facilities. (See Section 6.2, "Responses to Sub-recommendations.")

In support of the long-term strategy, the SDD will be produced as a key product of the SE process (see Figure 2). The SDD will describe the system(s) for safe, long-term utilization, storage, and/or disposal of U-233. (Sub-recommendation 7)

Deliverable: System Design Document
Responsibility: Assistant Secretary for Environmental Management (EM-1)
Date: October 1998

6.3.17 Commitment 17: Develop a multi-year program plan for implementation of the selected system design

As a key product of the SE process, the PEP will be produced, delineating in detail the

organization, control system, work breakdown structure, task definitions, multi-year schedule, and resources required to safely conduct life-cycle management of the Department's U-233 inventories. (Sub-recommendation 7)

Deliverable: Initial release of U-233 Safe Storage Program Execution Plan
Responsibility: Assistant Secretary for Environmental Management (EM-1)
Date: December 1998

6.3.18 Commitment 18: Prepare annual reports.

The Department will provide annual reports to the Board which will be submitted with the Board Recommendation 94-1 annual reports. (Sub-recommendation 1)

Deliverable: Annual Progress Report
Responsibility: Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60)
Date: January 1998, then annually thereafter

ATTACHMENT A: Acronyms and Abbreviations

ALARA	As Low As Reasonably Achievable
ASB	Air Support Building
Board	Defense Nuclear Facilities Safety Board
CMR	Chemical and Metallurgical Research
Department	Department of Energy
DP	Defense Programs
EM	Environmental Management
F&OR	Functional and Operational Requirements
HEU	Highly Enriched Uranium
ICPP	Idaho Chemical Processing Plant
ILTSF	Intermediate Level Transuranic Storage Facility
INEEL	Idaho National Engineering and Environmental Laboratory
IP	Implementation Plan
kg	Kilogram
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LWBR	Light Water Breeder Reactor
MD	Materials Disposition
MeV	Mega (Million) Electron Volts
MSRE	Molten Salt Reactor Experiment
NE	Nuclear Energy
NEPA	National Environmental Policy Act
NMSTG	Nuclear Materials Stabilization Task Group
ORNL	Oak Ridge National Laboratory
PEP	Program Execution Plan
Rn	Radon
RWMC	Radioactive Waste Management Complex
SDD	System Design Document
SE	Systems Engineering
SISMP	Site Integrated Stabilization Management Plan
SRD	Systems Requirements Document
Th	Thorium
Tl	Thallium
U	Uranium
USQD	Unreviewed Safety Question Determination
VA	Vulnerability Assessment

ATTACHMENT B: Glossary of Terms

Interim storage- Storage of U-233 prior to being included in the fully implemented U-233 Safe Storage Program.

Long-term actions- Actions associated with this IP whose completion dates are beyond December 31, 1998.

Long-term storage- Storage of U-233 controlled by the attributes and constraints of the fully implemented U-233 Safe Storage Program.

Near-term actions- Actions associated with this IP that will, in general, be completed by December 31, 1998.

ATTACHMENT C: Hierarchy of Functions

Function Number	Function Name	Function Description	Decomposed By (Functions)
0	Safely store U-233	Comply with the DNFSB request to DOE to make the storage of U-233 safer as specified in DNFSB Recommendation 97-1	1 Develop Strategy for U-233 Safe Storage 2 Ensure near term safety of existing inventory of U-233 3 Provide safe long term storage of U-233 4 Ensure final disposition
1	Develop Strategy for U-233 Safe Storage	Develop a strategy to convert the existing inventories of U-233 to a form that will permit safe long term storage until an ultimate disposition effort can be implemented.	1.1 Program Management 1.2 Develop System Requirements (SRD) 1.3 Develop U-233 Storage and Packaging Standard 1.4 Prepare U-233 handbook 1.5 Develop waste threshold criteria 1.6 Develop preliminary determination of Final Disposition Strategy 1.7 Develop Functional and Operational Requirements (F&OR) 1.8 Develop interim storage strategy/concept 1.9 Develop long term storage/disposition strategy 1.10 Develop storage system description document (SDD) 1.11 Prepare and issue U-233 Safe Storage Program Execution Plan (PEP)
1.1	Program Management	Establish a management system for the U-233 Safe Storage Program. The functions include conducting systems engineering workshops, program functional analysis, planning, coordination, and assessment.	1.1.1 Develop Program Functions 1.1.2 Conduct Systems Engineering Workshops 1.1.3 Plan and manage U-233 safe storage program 1.1.4 Coordinate Field elements during planning

Function Number	Function Name	Function Description	Decomposed By (Functions)
			effort 1.1.5 Assess available critical skills within DOE
1.2	Develop System Requirements (SRD)	Prepare a Systems Requirements Document which defines the technical and regulatory requirements that will drive the solution and implementation of 97-1.	1.2.1 Compile laws, regs and standards 1.2.2 Compile U-233-specific technical storage and handling requirements 1.2.3 Develop draft System Requirements Document (SRD) 1.2.4 Conduct SRD peer and management reviews 1.2.5 Conduct System Requirements Review
1.3	Develop U-233 Storage and Packaging Standard	Develop a standard for storage of U-233 for use by the implementers of 97-1.	1.3.1 Identify applicable regulations, laws and orders 1.3.2 Conduct survey of available U-233 literature 1.3.3 Develop proposed packaging and storage criteria for U-233 1.3.4 Develop final form of criteria and issue draft 1.3.5 Conduct U-233 standard peer and management reviews 1.3.6 Revise and issue final document
1.4	Prepare U-233 Technical data handbook	Document the accumulated data and knowledge of the DOE complex experience from working with U-233.	
1.5	Develop waste threshold criteria	Develop a criteria for determining when U-233 bearing material is waste or must be handled as a nuclear material. Identify waste categories for these wastes.	
1.6	Develop preliminary determination of Final Disposition Strategy	In order to plan for long term storage, some assumptions will be needed regarding ultimate disposition (or at least the probable options) to avoid creating a long term storage solution that is likely to be in conflict with the probable final disposition strategy. MD will prepare a report identifying the	1.6.1 Review applicable laws, regulations other guidance 1.6.2 Review existing policy and precedents for disposition of Pu and U

Function Number	Function Name	Function Description	Decomposed By (Functions)
		known alternatives for use in assessing their impact on the long term storage and processing strategies.	1.6.3 Develop alternatives 1.6.4 Task force review of alternatives 1.6.5 Identify disposition alternatives 1.6.6 Obtain DOE approvals
1.7	Develop Functional and Operational Requirements (F&OR)	Develop the Functional and Operational Requirements Document for the U-233 long term storage program.	1.7.1 Develop functional requirements based on legal, regulatory and technical external requirements 1.7.2 Develop operational performance requirements for U-233 storage systems 1.7.3 Create functional decomposition for U-233 systems 1.7.4 Prepare draft functional and operational requirements (F&OR) document 1.7.5 Team review and fine tuning of F&OR 1.7.6 Review Functional and Operational Requirements Document
1.8	Develop interim storage strategy/concept	Develop an approach and strategy to the short term storage of U-233 in an adequately safe manner.	1.8.1 Compile and analyze site assessments 1.8.2 Develop near term strategy documents
1.9	Develop long term storage/disposition strategy	Develop a long term storage strategy that will safely store U-233 for an extended period of time until an ultimate disposition strategy can be implemented. This strategy will be coordinated with the short term strategy to ensure an orderly transition.	1.9.1 Identify long term storage/disposition options 1.9.2 Analyze long term storage/disposition alternatives 1.9.3 Select optimal approaches 1.9.4 Assign ownership for long term storage 1.9.5 Document long term storage/disposition strategy

Function Number	Function Name	Function Description	Decomposed By (Functions)
1.10	Develop storage system description document (SDD)	Develop the System description document which will provide the basis for the beginning of the design process.	1.10.1 Translate concept/strategy into physical components 1.10.2 Prepare system description document (SDD)
1.11	Prepare and issue U-233 Safe Storage Program Execution Plan (PEP)	The Program Execution Plan (PEP) documents the plan for implementation of the design described in the System Design Description. The PEP, combined with the system design description, will define the path forward for the safe storage of U-233 in compliance with the objectives set forth in 97-1. Completion and approval of this document will constitute completion of the 97-1 project.	1.11.1 Identify responsible organizations 1.11.2 Define technical approach 1.11.3 Identify program products to be produced 1.11.4 Develop WBS for program 1.11.5 Define schedule objectives 1.11.6 Develop cost and schedule baseline for the program 1.11.7 Develop budget requirements 1.11.8 Finalize and issue PEP
2	Ensure near term safety of existing inventory of U-233	This function will address the near term storage issues for U-233 (2-6 years) while the preparations are underway for the implementation of the long term storage solution. The effort to be conducted in the short term will include a complete assessment (characterization) of existing facilities and the stored materials. It will also include any actions that are deemed necessary to protect the health and safety of the public and the workers who might be at risk from unplanned contact with the stored U-233 material. This step may include some consolidation of materials or even complete elimination of U-233 from a site if that is deemed appropriate and safe.	2.1 Manage remediation and interim storage program 2.2 Evaluate existing storage systems 2.3 Determine potential actions/options 2.4 Evaluate risks associated with potential actions and conduct appropriate NEPA review 2.5 Develop course of action 2.6 Implement additional near term action plans 2.7 Defer additional action to long term storage 2.8 Take planned near term actions to reduce risks 2.9 Operate interim storage system 2.10 Manage waste produced in near term actions

Function Number	Function Name	Function Description	Decomposed By (Functions)
2.1	Manage interim storage program	Managing the short term storage program will be site-managed with a coordination role by EM. Each site will manage their own materials with assistance and support from EM to ensure consistent application of safety criteria and coordination of any consolidation efforts. The coordinating organization will also receive copies of all facility assessment and inventory records which will be maintained current for use by the long term storage effort.	2.1.1 Manage and coordinate the overall DOE interim U-233 storage 2.1.2 Manage INEEL interim U-233 storage 2.1.3 Manage LANL interim U-233 storage 2.1.4 Manage ORNL interim U-233 storage 2.1.5 Manage small sites' interim U-233 storage
2.2	Evaluate existing storage systems	In order to make a determination as to whether any action is required to protect the health and safety of the workers and public, a risk assessment must be conducted before commencing work. This effort will be sufficiently detailed that there is a high level of confidence that there will not be any unexpected risks incurred.	2.2.1 Assess ORNL Storage system Conditions 2.2.2 Assess LANL storage system conditions 2.2.3 Assess INEEL storage system conditions 2.2.4 Assess small site conditions
2.3	Determine potential actions/options	Identify potential actions resulting from near term assessment efforts.	2.3.1 Determine potential actions at LANL 2.3.2 Determine potential actions at ORNL 2.3.3 Determine potential actions at INEEL 2.3.4 Determine potential actions at other sites
2.4	Evaluate risks associated with potential actions and conduct appropriate NEPA review	Determine the risks associated with taking the potential actions identified in function 2.3 and conduct appropriate NEPA review	2.4.1 Determine health and safety risks to workers 2.4.2 Determine risks to the environment and public 2.4.3 Determine potential economic risks 2.4.4 Prepare and issue risk assessment report
2.5	Develop course of action	Make the decisions as to what actions will be taken in the near term and what will be deferred until the long term solution is in place.	2.5.1 Conduct trade studies 2.5.2 Evaluate integration options 2.5.3 Determine priorities 2.5.4 Develop near term action plan
2.6	Implement additional near	Implement the near term actions resulting from function 2.5.	2.6.1 Implement additional near term actions at

Function Number	Function Name	Function Description	Decomposed By (Functions)
	term action plans		LANL 2.6.2 Implement additional near term actions at ORNL 2.6.3 Implement additional near term actions at INEEL 2.6.4 Implement additional near term actions at other sites
2.7	Defer additional action to long term storage	Record those actions which have been identified but are deferred to the long term storage effort.	2.7.1 Deferred LANL actions 2.7.2 Deferred ORNL actions 2.7.3 Deferred INEEL actions 2.7.4 Deferred other site actions
2.8	Take planned near term actions to reduce risks	Take necessary actions to reduce risks to acceptable near term levels.	2.8.1 Perform known near term actions at ORNL 2.8.2 Perform known near term actions at INEEL 2.8.3 Perform known near term actions at LANL 2.8.4 Perform known near term actions at other sites
2.9	Operate interim storage system	Monitor and maintain the facilities and inventories until the long term storage system is available.	2.9.1 Monitor & maintain U-233 inventory 2.9.2 Maintain & monitor facility and handling systems
2.10	Manage waste produced in near term actions	Manage the waste byproducts produced as a result of operations, packaging and handling of the U-233. Waste may be created as a result of reclassification or as a result of processing.	2.10.1 Process waste into disposable form 2.10.2 Place processed wastes into temporary storage 2.10.3 Transfer wastes to disposal site
3	Provide safe long term storage of U-233	Implement a long term storage system which provides the capabilities requested in DNFSB sub-recommendation 7.	3.1 Manage long term storage program 3.2 Design long term storage system

Function Number	Function Name	Function Description	Decomposed By (Functions)
			3.3 Obtain regulatory approval 3.4 Implement System 3.5 Operate Long term storage system 3.6 Maintain systems 3.7 Manage Long Term wastes
3.1	Manage long term storage program	Manage the long term storage system program and projects.	3.1.1 Assess project performance/status 3.1.2 Update cost and schedule baselines actuals 3.1.3 Manage changes to project baselines 3.1.4 Manage and coordinate interfaces 3.1.5 Manage project interfaces 3.1.6 Manage changes to baselines
3.2	Design long term storage system	Prepare conceptual, preliminary and final designs for the long term storage system. Prepare associated safety analysis reports to support licensing and permitting for the facilities.	3.2.1 Develop U-233 Process Design 3.2.2 Facility Advanced Conceptual Design 3.2.3 Develop EIS 3.2.4 Facility Preliminary Design 3.2.5 Develop Safety Analysis Report 3.2.6 Facility Final Design
3.3	Obtain regulatory approval	Perform the necessary actions to obtain regulatory approvals for the long term storage and processing facilities.	3.3.1 Obtain environmental regulatory approvals 3.3.2 Obtain nuclear regulatory approvals
3.4	Implement System	Build and/or remodel the facilities and associated systems resulting from the design process.	3.4.1 Build/remodel processing facilities 3.4.2 Build/remodel storage facility system(s) 3.4.3 Add, remodel or replace Material handling systems 3.4.4 Add, remodel existing transportation

Function Number	Function Name	Function Description	Decomposed By (Functions)
			facilities and equipment 3.4.5 Develop/remodel U-233 storage containers
3.5	Operate Long term storage system	Operate the long term storage system facilities and related systems.	3.5.1 Implement safeguards and security for site 3.5.2 Characterize U-233 existing materials 3.5.3 Stabilize form 3.5.4 Repackage to meet Long term criteria 3.5.5 Consolidate U-233 at selected sites
3.6	Maintain systems	Maintain the long term storage system facilities and related systems.	3.6.1 Maintain handling systems 3.6.2 Maintain processing systems 3.6.3 Maintain storage systems 3.6.4 Maintain transportation systems
3.7	Manage Long Term wastes	Process, store and dispose of wastes produced by the development and operation of the long term storage system	3.7.1 Process long term waste into disposable form 3.7.2 Place processed long term storage wastes into temporary storage 3.7.3 Transfer long term storage wastes to disposal site
4	Ensure final disposition	Provide a functional and cost effective final disposition of the U-233 materials. This could include disposition efforts at more than one point in the overall program if material has no potential for beneficial use.	4.1 Develop disposition alternatives 4.2 Evaluate environmental, schedule, and cost impacts for disposition strategy 4.3 Determine if beneficial use exists for some material 4.4 Determine disposition/utilization strategy (ROD) 4.5 Implement disposition/utilization 4.6 Manage disposition/utilization strategy

Function Number	Function Name	Function Description	Decomposed By (Functions)
4.1	Develop disposition alternatives	Develop the alternatives for final disposition. Consideration will be given to beneficial uses of the material as well as permanent disposition.	
4.2	Evaluate environmental, schedule, and cost impacts for disposition strategy	Evaluate the options developed in function 4.1	4.2.1 Conduct disposition trade studies 4.2.2 Prepare preliminary facility design requirements 4.2.3 Conduct site environmental data calls 4.2.4 Identify preferred alternative
4.3	Determine if beneficial use exists for some material	Assess potential beneficial uses and the potential impacts on the disposition efforts.	
4.4	Determine disposition/utilization strategy (ROD)	Develop the disposition strategy including the required regulatory compliance activities necessary to gaining acceptance of the preferred approach.	4.4.1 Conduct public meetings 4.4.2 Develop disposition EIS 4.4.3 Issue disposition ROD
4.5	Implement disposition/utilization	Implement capital improvement actions that are required to dispose of U-233 materials.	4.5.1 Make facility mods as required 4.5.2 Request legislation changes as required 4.5.3 Conduct disposition operations
4.6	Manage disposition/utilization strategy	Operate the disposition system	

APPENDIX

COMPLETED AND NEAR-TERM ACTIONS